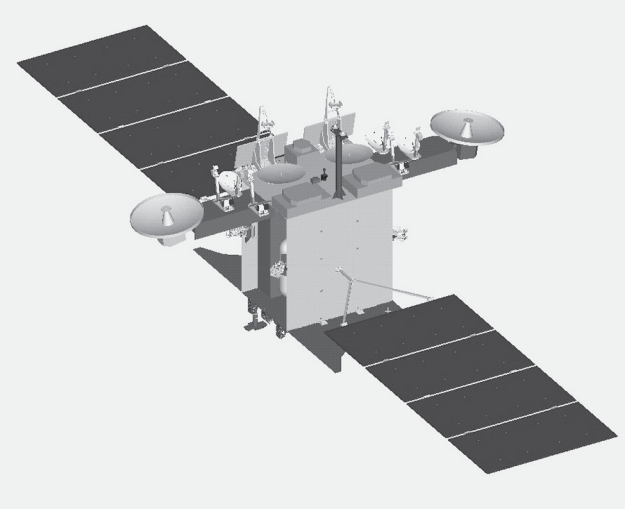
Advanced Extremely High Frequency (AEHF) Satellite Communications System

SUMMARY

- The Air Force is making progress on the four major technology risk areas – nuclear hardening and shielding, nuller spot beam, phased array antenna, and electric propulsion.
- Special attention will be required in testing capabilities not adequately tested or deferred under Milstar program. These areas include mission planning and the nulling antenna.
- The synchronization of Service terminal programs remains critical for both launch and operational testing.



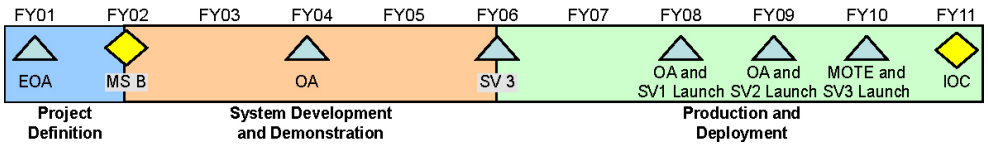
AEHF satellite communications system is designed to provide secure, survivable communications to U.S. warfighters during all levels of conflict.

SYSTEM DESCRIPTION AND MISSION

The Advanced Extremely High Frequency (AEHF) satellite communications system is designed to provide secure, survivable communications to U.S. warfighters during all levels of conflict. It will follow Milstar as the protected backbone of DoD's military satellite communications architecture, will increase system capacity by a factor of ten, and will increase the maximum data rate for an individual terminal from 1.544 Mbps to 8.192 Mbps. The first flight of the AEHF satellite program, named "Pathfinder", will be programmed to operate initially as a Milstar II satellite in order to complete the Milstar II constellation. The second flight will then be launched as a fully capable AEHF satellite. After it is operational, Pathfinder will be reprogrammed on-orbit as an AEHF satellite.

The first three program phases: AEHF Technology, Engineering Models, and System Definition are complete. At Milestone B, the Defense Acquisition Board authorized fabrication and assembly of the first two satellites (SV1, SV2), development and deployment of the ground command and control segment, and advanced procurement for one additional satellite (SV3) within the Future Years Defense Program. Following completion of the system-level Critical Design Review, a separate, tailored Milestone C was anticipated to provide the final authorization for production of SV3, SV4, and SV5. However, a February 2003-approved Acquisition Program Baseline incorporated a revised strategy that deleted SV4 and SV5. The strategy also discussed a decision point in 1QFY05 to evaluate Transformational Communications development and the need, if any, for additional AEHF satellites. The first AEHF launch is scheduled for 3QFY08 with the subsequent launches in 3QFY09 and 3QFY10.

TEST AND EVALUATION ACTIVITY



The Air Force Operational Test and Evaluation Center performed an early operational assessment and operational impact assessment in support of the Milestone B decision in 4QFY01. An operational assessment was conducted in FY04 in conjunction with the Critical Design Review. The Air Force Operational Test and Evaluation Center has not yet released the results of this operational assessment.

The Air Force will conduct a second operational assessment in FY07 to assess readiness of the AEHF Mission Control Segment to support the first AEHF launch. An operational assessment in FY07 will evaluate the results of the developmental test/operational test performed on the Pathfinder satellite to verify its full capability to function as a Milstar II low-data-rate/medium-data-rate satellite. Multi-Service operational test and evaluation, to be conducted in FY09, will evaluate whether the entire system, including equipment, personnel, procedures, training, and logistics support, is effective and suitable based on the operational requirements. The test will exercise satellite-to-satellite cross-links to evaluate theater-to-theater communications, network control, satellite control, and interoperability.

TEST AND EVALUATION ASSESSMENT

The system Program Office is making satisfactory progress on the four major technology risk areas: nuclear hardening and shielding, performance of the nuller spot beam, performance of the phased array antenna, and electric propulsion. Terminal synchronization remains essential for mission control and for a successful multi-Service operational test and evaluation. Monitoring the fidelity of the AEHF Universal System Test-Terminal simulator and the payload simulators is also imperative. If their configurations do not remain standardized and consistent with the true payload, the new terminals will not be compatible with the payload or with each other.

Also, modeling and simulation will assess nuller spot beam performance in a variety of single and multiple jammer scenarios. However, contractor model validation testing will be limited to only single jammer cases. DOT&E is concerned that the contractor needs more robust validation testing to reduce risks associated with using this model to evaluate nuller operational performance.

There is still a high program risk associated with the development of the cryptographic capability needed to integrate the AEHF extended data rate. This includes the manufacture of a highly complex Application Specific Integrated Circuit. Schedule slips in cryptographic development have consumed the entire available margin and are now pacing the program.